

## 2.

A Contribution to the Study of North American Cestodes  
of the Genus *Paruterina* Fuhrmann, 1906<sup>1</sup>.ROBERT RAUSCH<sup>2</sup> AND EVERETT SCHILLER.*Department of Veterinary Science, University of Wisconsin, Madison*<sup>3</sup>

(Text-figures 1-12).

Two of the 16 apparently valid species of *Paruterina* Fuhrmann, 1906, have been recorded from North American birds. *Paruterina similis* (Ransom, 1909) occurs in the yellow-billed cuckoo, *Coccyzus a. americanus* (L.), and *P. candelabraria* (Goeze, 1782) is the most frequently encountered cestode parasitic in owls. The latter occurs in Europe as well as in North America, and infects several species of owls (Wolffhügel, 1900; Rausch, 1948). Evidence to the present would indicate that a high degree of host specificity has been developed in the cestodes of this genus.

It is the purpose of this paper to describe two species of *Paruterina*, and to include some remarks concerning the two previously-recorded North American species. The undescribed species were collected by one of us (R. R.) from birds in the Jackson Hole region of Wyoming. Both were taken from hosts whose parasites probably have not been previously studied.

The Wyoming birds parasitized by cestodes of the genus *Paruterina* were a rock wren, *Salpinctes o. obsoletus* (Say), and a green-tailed towhee, *Chlorura chlorura* (Audubon), which were collected from the same area, along with numerous birds of other species. The wren was collected from the southeast slope of a hill, at an altitude of about 7,000 feet. Sandstone outcroppings were numerous here, and rock wrens were rather commonly observed among them. A marmot, *Marmota flaviventris nosophora* Howell, was the characteristic mammal of this zone. The towhees were common a few hundred feet lower, where a sage, *Artemisia tridentata* Nutt., was the characteristic plant. Brewer's sparrow, *Spizella b. breweri* Cassin, was also characteristic of this habitat.

In view of the fact that representatives of the genus *Paruterina* have not been often reported in North America, it seemed un-

usual to collect two undescribed species from so small an area. However, since the morphological differences are quite distinct, there can be no doubt as to their specific validity. As pointed out earlier (Rausch, 1948), the helminth parasites of the North American avifauna are only poorly known.

*Paruterina chloruræ* n. sp.

(Text-figs. 1-4).

*Diagnosis:* Strobila from 35 to 50 mm. long; greatest width, attained in terminal gravid segments, about 1 mm. Strobila consists of about 140 segments; margins of latter not serrate. Segments wider than long in mature segments, with a gradual increase in length as segments become older; terminal gravid segments, in well relaxed strobilae, considerably longer than wide. Scolex about 550  $\mu$  in diameter, not set off from neck. Suckers rather weakly developed, about 180  $\mu$  in diameter. Rostellum armed with a double row of hooks, from 40 to 42 in number; large hooks 20  $\mu$  long, and small hooks 16  $\mu$  long. Handle of larger hook about same length as guard and blade; guard of smaller hook relatively shorter, with blade and guard of nearly equal length.

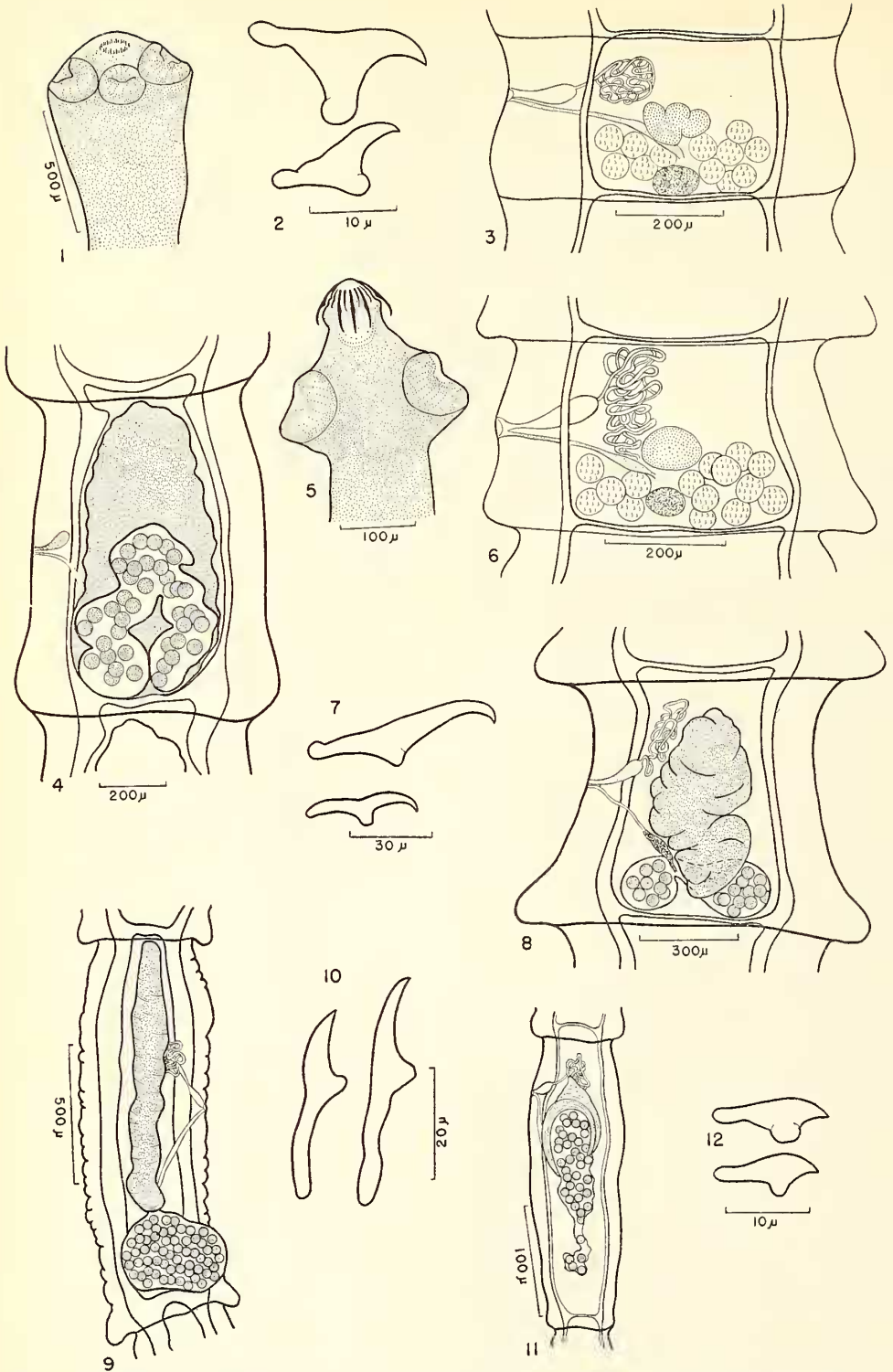
Ventral longitudinal excretory canals measure about 33  $\mu$  in diameter; dorsal canals about 10  $\mu$  in diameter, median to ventral canals. Transverse canals about 3  $\mu$  in diameter. Genital pores irregularly alternate; genital ducts pass between longitudinal excretory canals. Musculature well developed; longitudinal bundles numerous.

Cirrus sac anterior to vagina, from 105 to 119  $\mu$  long by 23 to 29  $\mu$  wide. Cirrus sac does not extend to level of ventral longitudinal excretory canal. Internal and external seminal vesicles absent. Vas deferens well developed and strongly coiled in area between poral ventral excretory canal and ovary. Testes spherical, from 10 to 12 in number; about 50  $\mu$  in diameter in mature segments. Testes lateral and posterior to female genital organs, not extending anterior to vagina on poral side, nor anterior to ovary on aporal side.

<sup>1</sup> Contribution of the 1948 Research Program of the New York Zoological Society at Jackson Hole Wildlife Park.

<sup>2</sup> Now with U. S. Public Health Service, Anchorage, Alaska.

<sup>3</sup> Parasitology Section, B. B. Morgan, Project Leader.



TEXT-FIGS. 1-12. 1. Scolex of *Paruterina chlorurae* n. sp. 2. Rostellar hooks of *P. chlorurae*. 3. Mature segment of *P. chlorurae*. 4. Gravid segment of *P. chlorurae*. 5. Scolex of *P. morgani* n. sp. 6. Mature segment of *P. morgani*. 7. Rostellar hooks of *P. morgani*. 8. Gravid segment of *P. morgani*. 9. Gravid segment of *P. candelabraria* (Goeze, 1782). 10. Rostellar hooks of *P. candelabraria*. 11. Gravid segment of *P. similis* (Ransome, 1909). 12. Rostellar hooks of *P. similis*.

Vagina runs directly from genital pore toward ovary; poral to latter it enlarges to form a well-developed seminal receptacle. Ovary slightly lobed, about 50 by 60  $\mu$  in mature segments; situated on mid-line near middle of segment. Vitelline gland spherical to ellipsoidal, about 20  $\mu$  in diameter; situated at posterior margin of segment on mid-line, directly posterior to ovary. Uterus appears as a crescent-shaped organ ventral to ovary; the arms lengthen until the organ assumes an inverted V-shape. In terminal gravid segments, arms of uterus become somewhat sinuous. Parauterine organ develops slowly from anterior margin of early uterus; it becomes elongate and finally attains anterior margin of segment. Spherical eggs, observed only in the uterus, measure from 43 to 50  $\mu$  in diameter.

*Host*: *Chlorura chlorura* (Audubon). (Green-tailed towhee).

*Locality*: Near Moran, Wyoming.

*Habitat*: Small intestine.

*Type*: Cotype material has been deposited in the Helminthological Collection of the U. S. National Museum, slide number 46421.

*Paruterina chlorurae* is differentiated from the other species of the genus by shape, size and number of rostellar hooks. Differentiation of this species is considered more fully under the discussion below.

#### *Paruterina morgani* n. sp.

(Text-figs. 5-8).

*Diagnosis*: Strobila about 40 mm. long; maximum width, attained in gravid segments, about 500  $\mu$ . Strobila consists of about 150 segments; margins of latter strongly serrate. Mature segments wider than long; they increase gradually in length as they become older, with gravid segments being slightly longer than wide. Scolex about 250  $\mu$  wide, distinctly set off from neck; suckers about 100  $\mu$  in diameter. Rostellum armed with a double row of 34 to 36 hooks; large hooks measure 66  $\mu$  long; short hooks measure 40  $\mu$  long. Blade of large hook, slightly longer than handle, curves downward abruptly at end; guard, near middle of hook, inconspicuous. Blade and handle of small hook nearly equal in length; guard, at middle hook, about  $\frac{1}{3}$  as long as blade.

Ventral longitudinal excretory canals about 13  $\mu$  in diameter; dorsal canals about 4  $\mu$ . Transverse canals about 3  $\mu$  in diameter. Genital pores irregularly alternate; genital ducts pass between longitudinal excretory canals. Musculature well developed; two rows of longitudinal and a single row of transverse fibers occur in close contact. Longitudinal muscle fiber bundles not numerous; accurate count not obtained.

Cirrus sac clavate, anterior to vagina; it extends beyond poral ventral excretory canal, and measures from 86 to 105  $\mu$  long by 16 to 20  $\mu$  wide. Internal and external seminal vesicles absent. Vas deferens well developed and strongly coiled; convolutions fill greater part of poral half of segment,

from end of cirrus sac to level of mid-line of ovary. Testes spherical, from 15 to 18 in number; about 50  $\mu$  in diameter in mature segments. Testes lateral and posterior to female genital organs; not extending anterior to vagina on poral side, nor anterior to ovary aporally.

Vagina runs directly from genital pore, without convolution, to form a well-developed seminal receptacle posterior and poral to ovary. Ovary unlobed, ellipsoidal; about 120  $\mu$  long by 80  $\mu$  wide in mature segments; situated in posterior half of segment, at mid-line. Vitelline gland ellipsoidal; about 60  $\mu$  long, situated directly behind ovary somewhat anterior to posterior margin of segment. Uterus appears as an elongate organ lying transversely in the posterior part of the segment, ventral to ovary. It enlarges gradually, and finally forms an elongate, irregular sac, situated at posterior margin or completely gravid segments. Parauterine organ grows gradually from anterior margin of uterus; it does not reach anterior margin of segment. Eggs spherical, observed only in uterus; from 36 to 43  $\mu$  in diameter.

*Host*: *Salpinctes o. obsoletus* (Say). (Rock wren).

*Locality*: Near Moran, Wyoming.

*Habitat*: Small intestine.

*Type*: Cotype material has been deposited in the Helminthological Collection of the U. S. National Museum, slide number 46422.

*Paruterina morgani* is differentiated from the other members of the genus by size, shape and number of hooks, as well as by other, less obvious details. This cestode is named in honor of Dr. B. B. Morgan, Department of Veterinary Science, University of Wisconsin.

#### DISCUSSION.

At least 18 species have been assigned to the genus *Paruterina*; of these, 2 species, *P. fuhrmanni* Baczynska, 1914, and *P. melierax* (Woodland, 1929) have been transferred to other genera. Three of the remaining species, *P. angustata* Fuhrmann, 1906, *P. guineensis* Joyeux and Baer, 1923, and *P. southwelli* Hilmy, 1936, have unilateral genital pores, and are immediately separated by this character from the species described in the present paper.

Of the North American species, *Paruterina similis* (Ransom, 1909) has been re-described by Linton (1927). This species was placed in the genus *Paruterina* by Jones (1929). Certain morphological details of this species have never been completely described; Linton (1927, page 50) stated "There is a short rostellum surmounted by a double circle of very short hooks. Their exact number was not satisfactorily made out, but there appear to be in the neighborhood of 40 . . ." Jones (1929) examined both Linton's material, and that of Ransom, but did not give further details concerning the hooks of *P. similis*. We found that *P. similis* possesses from 50 to 52 hooks, arranged in

a double row. The large hooks measure 13  $\mu$  long, while the small hooks measure 11  $\mu$  long. They are essentially the same in form, except that the larger hooks have a larger, more rounded guard (Text-fig. 12). Our observations were made under oil immersion on hooks which had been removed from the scolices, and were lying flat on the slide.

*Paruterina chloruræ* and *P. morgani* are differentiated from *P. similis* and *P. candelabraria* by hook size, shape and number (Text-figs. 2, 7, 10, 12). It is of interest to note that the North American species can also be separated by differences in the arrangement of the parauterine organ and the uterus in the fully-gravid segments (Text-figs. 4, 8, 9, 11). In fact, differences here are more obvious than are those seen in the mature segments. It might also be mentioned here that cestodes of this genus can easily be recognized as such macroscopically, at the time they are removed from the intestine of the host, by the appearance of the gravid segments.

The remaining 11 species, widely distributed geographically, are best separated by hook characters. All of these (*P. boviæ* Hübscher, 1937; *P. bucerotina* Fuhrmann, 1909; *P. cholodkowskii* Skrjabin, 1914; *P. daouensis* Joyeux, Baer, and Martin, 1936; *P. javanica* Hübscher, 1937; *P. meggitti* Johri, 1931; *P. otidis* Baczyńska, 1914; *P. parallelipida* (Rud. 1809); *P. purpurata* (Dujardin, 1845); *P. septotesticulata* Moghe and Inamdar, 1934; *P. vesiculigera* (Krabbe, 1882) all differ appreciably in hook size, shape and number.

There are also differences in testes number in most cases. Where there is overlapping of this character, hook differences serve to separate the species involved. Other taxonomic details need not be discussed here in order to separate the species described in the present paper.

## REFERENCES.

- BACZYŃSKA, H.  
1914. Études anatomiques et histologiques sur quelques nouvelles espèces de cestodes d'oiseaux. *Bull. Soc. Neuchât. Sci. Nat.*, 40:187-239.
- FUHRMANN, O.  
1906. Die Tänien der Raubvögel. *Centralbl. Bakt. Parasit. (orig.)*, 41:212-213.
- JOHRI, L. N.  
1931. A new cestode from the grey hornbill in India. *Ann. Mag. Nat. Hist.*, 8, ser. 10, pp. 239-242.
- JONES, M. F.  
1929. Tapeworms of the genera *Rhabdometra* and *Paruterina* found in the quail and yellow-billed cuckoo. *Proc. U. S. Nat. Mus.*, 75, Art. 20, pp. 1-6.
- LINTON, E.  
1927. Notes on cestode parasites of birds. *Proc. U. S. Nat. Mus.*, 70, Art. 7, pp. 1-73.
- MOGHE, M. A. AND INAMDAR, N. B.  
1934. Some new species of avian cestodes from India with a description of *Biuterina intricata* (Krabbe, 1882). *Rec. Ind. Mus.*, 36:7-16.
- RAUSCH, R.  
1948. Observations on cestodes in North American owls, with the description of *Choanotaenia speotytonis* n. sp. (Cestoda: Dipylidiinae). *Amer. Midl. Nat.* 40 (2): 462-471.  
1949. *Paradilepis simoni* n. sp., a cestode parasitic in the osprey. *Zoologica*, 34 (1): 1-3.
- SKRJABIN, K. I.  
1914. Vogelcestoden aus Russisch Turkestan. *Zool. Jahrb. (syst.)* 37:411-492.
- WOLFFHÜGEL, K.  
1900. Beitrag zur Kenntnis der Vogelhelminthen. Inaug. Diss. Basel. 204 pp.